HYBRID APPROACH OF BBO AND GA USING IMAGE CLASSIFICATION OF NATURAL TERRAIN FEATURES

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***ABSTRACT*--- These days, Swarm intelligence has become one of the most popular research areas. There exist various algorithms of swarm intelligence that can be used for the applications of computational intelligence techniques to solve the optimization problems, robotic problems, shortest path finding, image classification, image enhancement, natural language processing techniques and many more. In research biogeography based optimization (BBO) and genetic algorithm (GA) are used that are inspired from natureInthis studies weare applied the hybrid biogeography based optimization (BBO) and geneticalgorithm (GA) for remote sensing image classification of a natural features. Biogeography based optimization (BBO) is a used to finding the path extraction, morphological operator, obstacle detection is used to smooth image. Genetic algorithm (GA) is used to obstacle avoid and shortest path for sources to destination point. The hybrid algorithm are compared with the result obtained by other swarm intelligence based Hybrid algorithm rough/BBO, FPAB/BBO, fuzzy/BBO, ACO/BBO, CS/ACO CS/PSO to show the evidences of our proposed hybrid algorithm.**

***KEYWORDS:*Biogeography based Optimization, Migration, Mutation. , terrain features,obstacle detection and avoidance, Path planning, genetic algorithm, remote sensing.**

I. INTRODUCTION

The research area of the swam intelligence under the biogeography based optimization (BBO) and genetic algorithm (GA)have a pick for a hybrid algorithm. In the swarm intelligence the social can obtain gathering information about the environments with interact the remote sensing and environmentindirectly. We can find the terrainfeatures to the nature like as bee colony ,ant colony, bird, ,cuckoo search etc.The kinds of complicationare face using the paths like how to find the smooth image. Firstly the study of biogeographybased optimization (BBO) and genetic algorithm (GA) techniques of a swam intelligence to hybrid approach of a BBO and GA.[1]In this hybrid approachof biogeography based optimization (BBO) and Genetic Algorithm (GA) describes the autonomous navigation for the out door win which is includes the terrain mapping, obstaclefind and avoidance, and target finding thecross-country using the Swarm Intelligence. In this aresearch paths and obstacles extracted fromsatellite image. And the plan can be carry out the various kind of the target. [2][3]Rest of the paper is organized as follows: Section II gives the basics of satellite images, remote sensing concept, GA, and BBO Section III methodology. Section IV gives the comparison of results and section V conclusion.

II. SATELLITE IMAGE, GENETIC ALGORITHM, *BIOGEOGRAPHY BASEDOPTIMIZATION.*

2. Satellite Image

2.1 Satellite Image

Remote sensing is a Science art of research in which information about an object, area or phenomenon can be obtained that is not in physical contact with that object ,place , area or phenomenon included considered for investigation Remote sensing image can be the made use a number of applications, surrendering reconnaissance, production of map products for militant and civil applications, evaluation of environmental suffering, growth regulation, following of land use, soil assessment, urban planning, radiation monitoring, and crop yield assessment [4].
The Remote sensing image is a one of the most popular approves for know the various soft computing in nature terrain features . it is well known that a human being perceives all the information about the surrounding world with the help of this five sensing. Remote sensing involves a wide spectrum of sensing process. Based on the sensing elements ,remote sensing can be categorized into 2 types :Active remote sensing and passive remote sensing .A Satellite is basically an autonomous receiver & transmitter device that has been introduced by human expertise in the outer space. The communication with these satellites to achieve the required data on earth is known as satellite communication. In our day to day life all the cellular/T.V. channel coverage is transmitted to our homes with the help of satellite. Even in this advanced era of technology where some advanced concepts of fibre optics cables and digital switching systems introduced but the basic need of tele-communication is completed by satellite around the world. The two major kinds of satellites are Polar satellite and Geo-stationary satellites

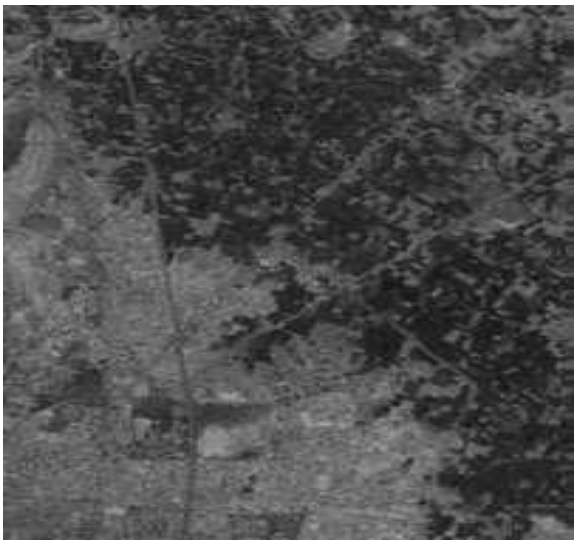


Figure1. Red band satellite image (input image)

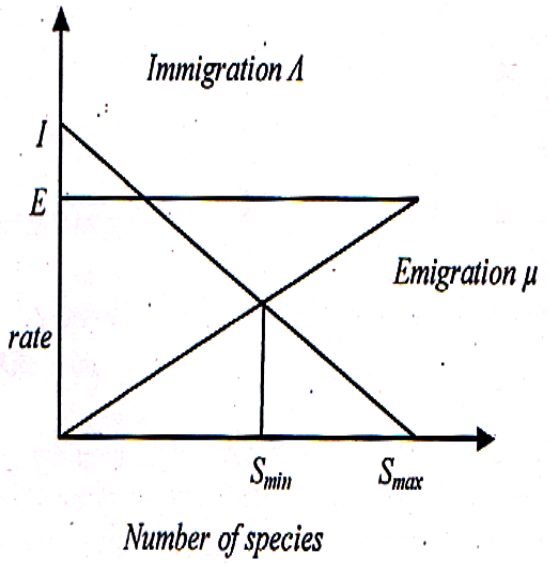


Fig 2. Biogeography based optimization (BBO)

2.2 BIOGEOGRAPHY BASED OPTIMIZATION (BBO)

A science of the biogeography based optimization (BBO) hasgrow by naturalists like Alfred Wallace and Charles Darwin. Till 1967, A biogeography based optimization (BBO) was in the main adescriptive studiesto themeans is likely to the call of the no of the species to a habitat(a habitat is an ecological area that is inhabited by a particular plant or animal species and which is geographically isolated from other habitats.[5] Each habitat is classification by habitat suitability index (HSI). The HIS value depends upon the many features of the habitats like rainfall, temperature, diversity of the vegetation, land area, safety and security.[6] Each of these features that todefine habitability is called as suitability index variables (SIV). SIVs a independent variables while HSI are the dependent variables immigration rate λ and emigration rate μ. [7][8] A. immigration and emigration depend upon the number of the species to the habitats. A valves of the immigration and emigration rate are given

$\lambda = I (1 – k / n)$

$\mu = E / n$

Where I is the max values of immigration rate, and E is the max emigrationrate, k is the no of a species and N is the totally no of a species .

2.3 GENETIC ALGORITHM (GA)

Genetic Algorithmsis a soft computing techniques and the mimic biological evolution as a solvingproblem .its was invented by john Holland in the year of 1960 and it was develop by Goldberg**.** Genetic Algorithms is search algorithms based on usual heredity that give robust search ability in comprehensive spaces. GA maintains a population of potential solutions of the applicant trouble termed as persons [9]. Treatment of these Individuals through genetic operator such as assortment, intersect and alteration, GA evolves towards better solution over a number of generation.The main advantage of the GA in the case of with its handle kind of the constraints or function objectives, all such of thing can be used a weighted components of the fitness function make its easy to adapt the GA scheduler the particular requirement of a very most wide range of possible over all objectives.

2.3.1 Working principle of the genetic algorithm (GA)

Genetic algorithm (GA)a set of solution is known as population. Solution for one population can used solution of new population. Solution can selected to the fitness values according to the new solutions.This is a repeated a some number of condition like number of a population or improve the best solution..

1. Create a random population n chromosomes therefore suitable number of problem.
2.Check the number of fitness values f(x)of the every chromosome x of the population.
3. Create a new population according to the step until the new population complete.
(a) Select the 2 number of parents chromosomes for the population according to the fitness.

(b) Crossover probability, cross over the parents to the new children. If number of the cross overwas performed, children are the correct copy of his parents.
(c) Mutation probability, mute new children of the position in chromosomes.
(d) Place the new population in the new offspring

4. New population can run the future algorisms .
5. If the condition if satisfied and returns the best location of the current population.
6. Go to the step 2 .

III. METHODOLOGY

3.1 A solution process of the BBO

There are 4 types of the islands andeach islandshaving the HIS value and they calculate the means of 2 pixels values of each islands and check a SVIs value. The belongs SIVs which island check means that high island So, we can divide the histogram value of the 4 types of islands Region 1 take 2 pixel value of he load islands and the calculate the HIS value of each island for the immigration and emigration region. Region II calculate the HISvalue of thecomplete image .and the region Region III checks the conditions of SIVs value of the high HIS

***Fig 3 BBO** after applying paths and obstacles extracted.*

3.2 Obstacles detection

Interference detection (OD) is one of the important components of the supervising system of uncontrolled vehicles. In the cover of indoor navigation, interferences are typically explained as surface title that is higher than field plane, but in snappy-country and random environments the opinion of "field plane" is often raw.

3.3 Morphological operations

Morphology is an approach of image conversion based on pattern. The value of every pixel in the output picture is depends on differentiating of the comparable pixel in input segment with itssurrounding. By selecting the size and pattern of the surrounding, you can create a morphological operation which is responsive to specific patterns in the input segment.

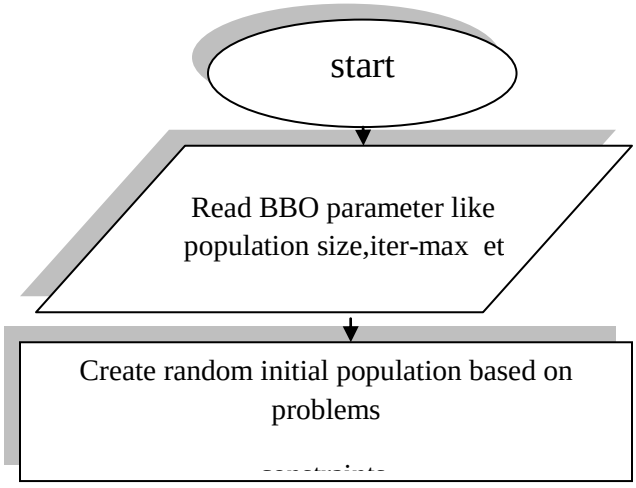
Fig 4. Refined paths after morphological operations

3.4The threshold value using GA

To calculate the value of threshold, and we can created the agents of the various regions to the assigned for the image .Each agents can scan the image row wise to find the best position of the each row and yetcalculateits global best for the assigned regions. Among these regionalglobal bests the agents select the most important suitable bidder solution bya communicating with each other. This is called as the Threshold value orthe Global best.

3.5 Simulation

The suggested algorithm is processed with MATLAB[11]. The hybrid approach based on the BBO and GA we can apply on the red satellite image. Firstlythe satelliteimage cancalculate the HIS valuesthrough BBO for a paths extraction and obstacledetection. To the obtain the HIS values islands load in a sated area and also we can check the SIVs condition for the each island . The high HSI islands were calculated. The paths extracted after applying BBO. Finally GA the implementation finding the shortest thepath from a given sources point the target point and find the best results .



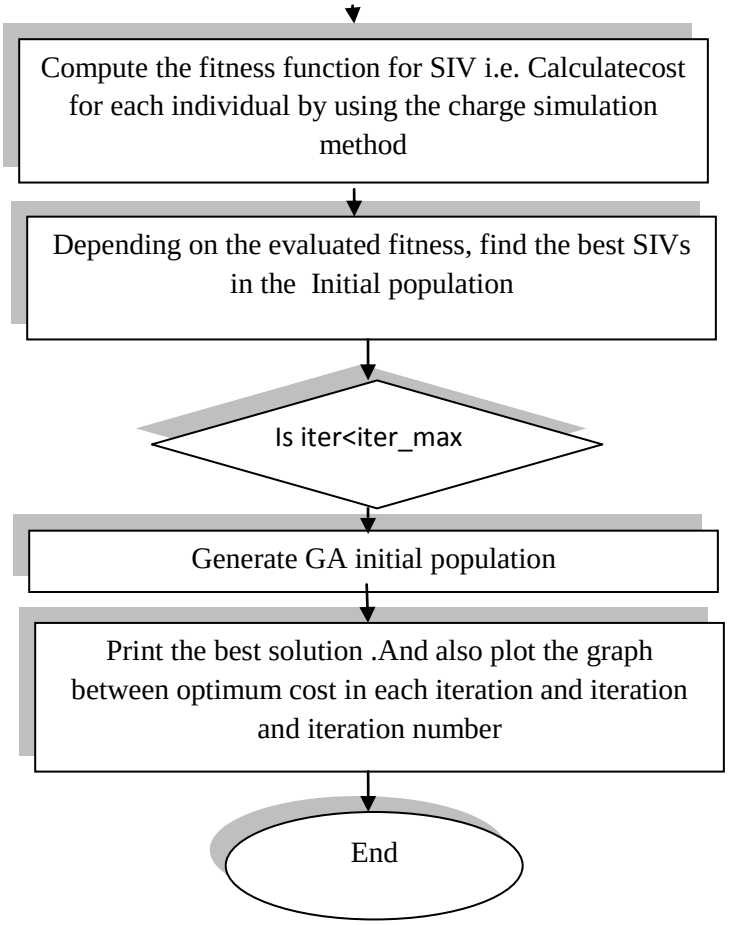


Fig 5 flowchart of the proposed algorithm

The pseudo-code of the proposed algorithm.

Step1 : Take the satellite images as input .

Step 2: Compute the each island like i1…….iN

Step 3: Gather a two pixel value of each island**.**

Step 4: Calculate the HIS value of two pixel using immigration and emigration.

Step 5: Calculate the whole image of the HIS value.

Step 6: check the SIVs conditions .

For every island

SIVs belongs to i1.

High IS HIS

Check the next.

End

End

Step 7 : Finding the paths obstacle and extracted using a BBO techniques of a swam intelligence .

Step 8: Refine paths using smoothing image

IV.RESULTS

Finally,biogeography based optimization (BBO)are implemented in which initialized and they are finding the bestshortest path for source point to destination point and to avoidances a obstacles for source point to target point and according to the goal defined. Figure 5show the best shortest path for source point to target point.

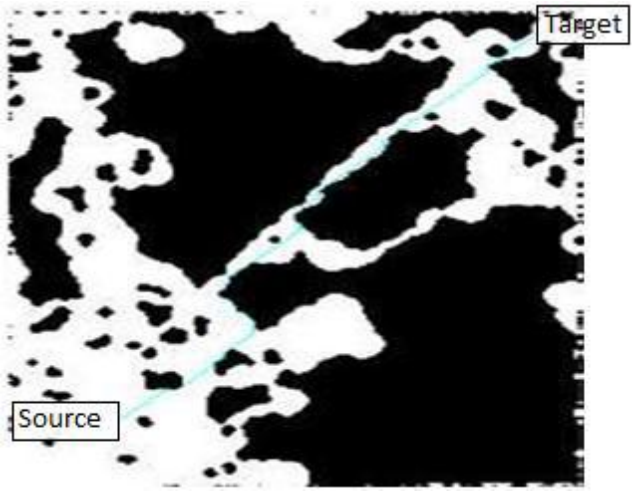


Figure 5 show the best shortest path for source point to target point.

Fig 6 show the bar graph according to the results of the thesis

IV. CONCLUSION

As concluded,biogeography based optimization (BBO)is a more reliable and fast research algorithm in a image classification.Biogeography based optimization (BBO) is therefore ageneralization of genetic algorithm .Biogeography based optimization (BBO) is a used to finding the path extraction, morphological operator, obstacle detection is used to smooth image.Genetic algorithm (GA) is used to obstacle avoid and shortest path for sources to destination point. The simulation results show that simple quick and efficient algorithm.

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REFERENCES

[1]Sood(2010)," Cross-Country Path Finding using Hybrid approach of PSO and BBO", International Journal of Computer Applications, vol. 7 no.6, pp.3-5.

[2]Kundra(2010)," Cross-Country Path Finding using Hybrid approach of BBO and ACO", International Journal of Computer Applications, vol. 7 no.6, pp.3-5.

[3] Campbell, J.B. (1987) "Introduction to Remote Sensing", The Guilford Press, New York.

[4]T.M. Lillesand and R.W. kiefer "Remote Sensing & Image Interpretation", 6th edition, Wiley, 2008.

[5]Ergezer, M., Simon, D. and Du, D. (2009), "Population Distributions in Biogeography- BasedOptimization Algorithms with Elitism", In Proceedings of IEEE International Conference onSystem, Man and Cybernetics, San Antonio, U.S.A., pp.3-8.

[6]Macarthur, R. and Wilson, E. (1967), "The Theory of Biogeography", First Edition, Princeton University Press, New Jersey, pp.19-67.

[7]Singh (2010), "Design of Yagi-Uda Antenna Using Biogeography Based Optimization", IEEE Transactions on Antennas and Propagation, vol. 58, no. 10, pp. 2-2.

[8]Ergezer, M., Simon, D. and Du, D. (2009), "Population Distributions in Biogeography- Based Optimization Algorithms with Elitism", In Proceedings of IEEE International Conference on System, Man and Cybernetics, San Antonio, U.S.A., pp.3-8.

[9]Jiawei Han, MichelineKamber, "Data Mining Concepts and Techniques" Second Edition, Morgan Kaufmann Publishers,2006, Elsevier Inc.

[10]Drawin,C.(1995), "The Origin of Species," Sixth Edition, Grameny Book, New York, pp.343-396.